

Research Note 84-60

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FIELD TRIALS OF THE MK60 TANK GUNNERY SIMULATOR
IN ARMOR INSTITUTIONAL TRAINING COURSES
VOLUME II: TRAINING AND TESTING MATERIALS

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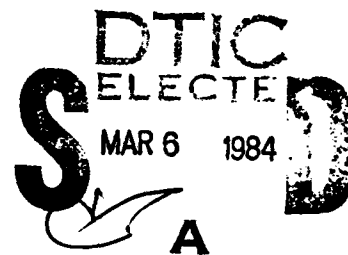
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**FIELD TRIALS OF THE MK60 TANK GUNNERY SIMULATOR
IN ARMOR INSTITUTIONAL TRAINING COURSES
VOLUME II: TRAINING AND TESTING MATERIALS**



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BRIEF

Requirement:

The continuing high cost of ammunition, fuel, and spare parts has led Armor training institutions to increase their use of simulation in training. A recently developed simulation device is the MK60 developed by Perceptronics, Inc. This device may provide tank gunners with valuable practice and experience. To assess the usefulness of the MK60, systematic field trials were conducted in institutional courses. The field trials required the preparation of specific training and testing materials.

Procedure:

Using previously developed training objectives and target scenario specifications as guides, a training and testing program was prepared. To implement the program, three basic types of materials were required: (a) training, (b) testing, and (c) miscellaneous. Since the field trials used students from both Basic Armor Training (BAT) and Armor Officer Basic (AOB), two sets of all materials were needed, one for BAT students and instructors, and one for AOB students and instructors.

Findings:

Materials developed for training consisted of (a) videodisc materials to be used on the device, (b) lesson plans to guide instruction of students on the device, and (c) instructor training materials. Testing materials consisted of (a) ability pretests, (b) device tests, (c) questionnaires for students and instructors, and (d) materials to guide dry and live fire tests. Miscellaneous materials consisted of (a) various forms for recording the performance of students, and (b) instructions to assist the staff in administering tests and in informing students about their role and responsibility in the field trials.

Utilization:

The materials developed can be used directly by device evaluators. Other agencies or organizations can use the materials to assist in conducting training on the MK60.

FIELD TRIALS OF THE MK60 TANK GUNNERY SIMULATOR
IN ARMOR INSTITUTIONAL TRAINING COURSES
VOLUME II: TRAINING AND TESTING MATERIALS

A brief description of the contents of each appendix of this volume is given below. A description of the procedures that were used with each set of materials is given in Volume I of this report.

<u>Appendix Title</u>	<u>Appendix Contents</u>
A. Contents of 20 Problem Videodisc	List of 20 main gun engagements used as training device materials for both AOB and BAT subjects. The list cites type of target, target range, target movement, etc.
B. AOB Lesson Plans	Complete AOB lesson plans with fully stated training objectives. They guided training on the MK60 device.
C. AOB Instructor Training Materials	Materials used to enable AOB instructors to train students on the MK60 device.
D. Device Tests	List of engagements in the improvised test, showing target type, range, movement, etc. (Test Y) Also included is a list of engagements in the test especially prepared for Study II of the evaluation (Test X).
E. AOB Dry and Live Fire Tests	List of materials employed in the dry fire test as conducted on Kennedy range. A copy of Table VI is also included.
F. AOB Student Questionnaire	Items in questionnaire administered to all AOB students who trained on the MK60.
G. AOB Instructor Questionnaire	Items in questionnaire administered to AOB instructors who trained students on the MK60.
H. Miscellaneous Materials	Copies of test forms and other materials used in conducting the field trials. Included are copies of forms for recording performance of students on tests and during training on the device.

- | | |
|---|---|
| I. Ability Pretests | Copies of instructions tape recorded for presentation to subjects and copies of visual stimuli used in the tracking test. |
| J. BAT Lesson Plans | Complete BAT lesson plans with fully stated training objectives. They guided training on the MK60 device. |
| K. BAT Instructor Training Materials | Materials used to enable BAT instructors to train students on the MK60 device. |
| L. BAT Dry and Live Fire Tests | List of Materials employed in the dry fire test as conducted on Boydston and Donnelly ranges. |
| M. BAT Student Questionnaire | Items in questionnaire administered to all BAT students who trained on the MK60. |
| N BAT Instructor Questionnaire | Items in questionnaire administered to BAT instructors who trained students on the MK60. |

List of Appendices

<u>Appendix</u>	<u>Title</u>	<u>Page</u>
A	List of Twenty Engagements	5
B	AOB Lesson Plans	9
C	AOB Instructor Training Materials	23
D	Device Tests	29
E	AOB Dry and Live Fire Test Materials	33
F	AOB Student Questionnaire	45
G	AOB Instructor Questionnaire	51
H	Miscellaneous Materials	59
I	Ability Pretests	69
J	BAT Lesson Plan	79
K	BAT Instructor Training Materials	107
L	BAT Dry and Live Fire Test Materials	115
M	BAT Student Questionnaire	125
N	BAT Instructor Questionnaire	131

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Appendix A
Contents of 20-Problem Videodisc

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Appendix A
Contents of 20-Problem Videodisc

Engagement Number	Target Type	Target Range	Target Movement	Target Cover	Ammo
1	Tank	456	Closing	No	HEAT
2	Tank	500	Closing	No	HEAT
4	Tank	1000	Closing	No	HEAT
6	Tank	1030	Closing	No	APDS
7	APC	800	Closing	No	HEP
10	Tank	500	Crossing	No	HEAT
11	Tank	1000	Crossing	No	APDS
12	Tank	406	Closing	Yes	APDS
13	Tank	588	Closing	Yes	APDS
14	2 Tanks	1400	Closing	No	APDS
15	APC	1326	Crossing	No	HEAT
16	2 Tanks	1400	Closing	No	APDS
17	APC	1130	Crossing	No	HEP
18	Tank	1200	Crossing	No	HEAT
20	Tank	1130	Closing	Yes	HEAT
22	Tank	500	Crossing	Yes	APDS
23	Tank	1430	Crossing	No	APDS
24	2 Tanks	1230	Crossing	No	HEAT
25	Tank	1300	Crossing	Yes	HEAT
26	2 Tanks	1230	Crossing	No	HEAT

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Appendix B

AOB Lesson Plans

<u>Contents</u>	<u>Page</u>
Module 1	13
Practice Monitor Form	17
Module 2	19
Practice Monitor Form	21

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AOB
Experimental
Videodisc MK60
Gunnery Training
Lesson Plan

TYPE

Practical exercise modules to accompany existing AOB Conduct of Fire POI

TIME ALLOTTED

240 minutes for Module 1 (Annex A)
120 minutes for Module 2 (Annex B)

COURSE PRESENTED TO

Armor Office Basic, Armor Track (M60A1)

TOOLS, EQUIPMENT AND MATERIALS

See Annex C

PERSONNEL

Assistant instructors (1 per four students)
(Coordination of MK60 P.E. with regular P.E. will be facilitated by
ARI/HumRRO personnel.)

INSTRUCTIONAL AIDS

See Annex C

REFERENCES

- a. FM 17-12
- b. FM 17-12-2
- c. AOB Lesson Plans:
 - i) Conduct of Fire, M60A1
 - ii) Table I, II, III, IV
- d. Training Objectives and Videodisc Specifications for Use With the Perceptronics Videodisc Gunnery Simulation. ARI/HumRRO, January 1982.

1. INTRODUCTION (To be presented at the end of the COF Conference).
 - a. During this period of instruction you have learned the fire commands and crew duties for direct fire. During the practical exercise which follows, and during the Lab 6 exercise scheduled tomorrow, part of you will practice M60A1 gunner skills on the MK60 gunner trainer. The MK60 is a new device being evaluated as a gunnery trainer. Please note, that because of technical and logistical limitations, many of the practice exercises on this new trainer ask you to fire on friendly vehicles. We acknowledge that this is contrary to gunnery policy.
2. ORGANIZATION
 - a. This afternoon six crews of four men each will fire the MK60 trainer (MK60 pretest).
 - b. Tomorrow four of these crews will practice an additional two hours on the MK60 trainer (PE Module 1).
 - c. During Tables I - IV two of these crews will practice an additional one hour on the MK60 (PE Module 2).
3. Practical Exercise Module 1

See Annex A.
4. Practical Exercise Module 2

See Annex B

AOB
Experimental
Videodisc MK60
Gunnery Training
Annex A
Module 1

INSTRUCTOR'S GUIDE - Conduct of Fire

1. TYPE OF EXERCISE

Application of Conduct of Fire Procedures

2. TIME ALLOTTED

4 hours total, 1 hour per student

3. EQUIPMENT

See Annex C

4. ORGANIZATION

a. Personnel:

- (1) Assistant Instructor per four students
- (2) ARI/HumRRO coordinators

b. Prior to student's arrival, the assistant instructors will:

- (1) Be completely familiar with FM 17-12, Chapter 9.
- (2) Be instructed on the operation and use of the MK60 Gunnery Trainer.
- (3) Be completely familiar with the MK60 practical exercise procedures (Annexes B and C).

c. Sixteen students will be practicing on the MK60 for one hour each during the four hour Lab 6 period of the second day of COF. Students will rotate by crew assignment, such that members of participating crews will work individually on the MK60 for one hour and will work as a crew on the normal turret trainer instruction for three hours.

5. EXPLANATION/APPLICATION

a. The training objectives for this lesson include the following:

TASK: Perform the steps required of the M60A1 tank gunner using the MK60 simulator.

CONDITIONS: Given a functioning MK60 simulator, standard floppy disc, MK60 kill zone set at 100%, and the twenty-problem videodisc.

STANDARDS: Achieve the level of performance stated below for each intermediate objective.

1. Intermediate Training Objective 1:

TASK: Respond to TC fire commands.

CONDITIONS: Given an MK60 simulator with TC fire commands recorded on videodiscs. All gunner operated switches will be off at start of each mission.

STANDARDS: The gunner must respond correctly to the fire command as issued, in sequence and without prompts. He must announce "IDENTIFIED." He must not fire until "FIRE" is announced and he must announce "ON THE WAY" and pause before firing.

2. Intermediate Objective 2:

TASK: Engage moving main gun targets.

CONDITIONS: Given an MK60 simulator and twenty-problem disc with 16 main gun approaching, retreating, evading and flank moving targets.

STANDARDS: Track and apply appropriate lead necessary to hit targets.

3. Intermediate Objective 3:

TASK: Sense and observe main gun rounds.

CONDITIONS: Given an MK60 simulator and regular floppy disc.

STANDARDS: Gunner must announce correct sensing and "BOT" or correct observation.

4. Intermediate Objective 4:

TASK: Apply BOT to a sensed main gun round.

CONDITIONS: Given an MK60 simulator and regular floppy disc.

STANDARDS: Achieve a second round hit following a first round miss.

5. Intermediate Objective 5:

TASK: Engage main gun multiple targets.

CONDITIONS: Given an MK60 simulator, regular floppy disc and twenty-problem disc with four multiple main gun engagements.

STANDARDS: Respond to initial fire command; achieve a hit on first announced target, and adjust fire to achieve a hit on second target.

b. Assistant Instructors Duties:

1. The primary duties of the AI are to instruct the student gunner using the MK60 gunnery simulator.
2. The AI/TC is responsible for demonstrating MK60 operation to students and presenting MK60 practice engagements in the sequence prescribed below. There are four sets of engagements. Students will repeat each set of engagements until each has achieved a mission score which is 80% of possible or until the maximum practice time for the set has elapsed.
3. The AI will ensure that each student's Practice Monitor Form is filled out properly including:
 - (1) Student's name
 - (2) Student's company and platoon
 - (3) AI/TC name
4. The AI will have students record their mission scores on their Practice Monitor Form following each engagement.
5. The AI will give each student gunner a critique at the conclusion of each set of engagements outlined below.
6. Prior to presenting engagements, demonstrate the operation of the MK60. Particularly point out what a "miss burst" looks like, what a "hit burst" looks like, and the different feedback scores that are provided.
7. As each student undertakes the engagements, periodically check that he turns on (and off) appropriate switches and announces "IDENTIFIED" and "ON THE WAY" as required.
8. Remind student that friendly vehicles are in all other circumstances not to be fired on. However, they were the only vehicles immediately available for videodisc production.

c. Conduct of Fire Exercises for the MK60.

1. Exercise Set 1: Approaching targets--close range. The MK60 will be programmed to present engagements 1, 2, 7, 12, and 13. Maximum time for this set of exercises is 10 minutes. 80% criterion scores are as follows:

<u>Engagement</u>	<u>Criterion</u>
1 -	80
2 -	80
7 -	120
12 -	136
13 -	136

2. Exercise Set 2: Approaching targets--distant or evasive targets. Engagement sequence and 80% criterion scores are as follows:

6 -	80
25 -	304
11 -	120
22 -	208
4 -	80

Maximum time for this set of exercises is 15 minutes.

3. Exercise Set 3: Moving targets. (Many of these targets are moving too slow for standard leads. Use about 1/2 standard lead.)

Engagement sequence and 80% criterion scores are as follows:

10 -	120
15 -	184
23 -	208
17 -	184
18 -	184

Maximum time for this set of engagements is 20 minutes.

4. Exercise Set 4: Multiple target (Use regular floppy disc). Engagement sequence and criterion scores are as follows:

14 -	160
24 -	368
16 -	160
26 -	368

Maximum time for this set is 10 minutes.

MK60

Practice Monitor Form

Student Name _____

AI/TC Name _____

AOB Class _____

Date _____

Use this form to record mission scores each time an engagement is practiced on the MK60. Space is provided for three repetitions of each exercise set. Spend no more time than indicated for each set.

Exercise Set 1 - Approaching, close range (10 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
1												
2												
7												
12												
13												

Exercise Set 2 - Approaching, long range and evading (15 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
6												
25												
11												
22												
4												

Exercise Set 3 - Moving (20 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
10												
15												
23												
17												
18												
20												

Exercise Set 4 - Multiple targets (10 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
14												
24												
16												
26												

AOB
Experimental
Videodisc MK60
Gunnery Training
Annex B
Module 2

INSTRUCTOR'S GUIDE - Conduct of Fire, extended MK60 practice.

1. TYPE OF EXERCISE

Application of Conduct of Fire Procedures

2. TIME ALLOTTED

2 hours, 1 hour per student

3. EQUIPMENT

See Annex C

4. ORGANIZATION

a. Personnel:

- (1) Assistant Instructor per four students
- (2) ARI/HumRRO coordinator

b. Prior to student's arrival, the assistant instructors will:

- (1) Be completely familiar with FM 17-12, chapter 9.
- (2) Be instructed on the operation and use of the MK60 Gunner Trainer.
- (3) Be completely familiar with the MK60 practical exercise procedures (Annexes A thru C).

c. Two four-man crews will practice on the MK60. These two crews will be selected at random by the HumRRO coordinator from the four crews who practiced on the MK60 previously on Module 1. Students will work individually for one hour. Four students from the same crew will practice for one hour of the time period and the second crew of four students will practice another hour.

d. Training will take place during the third and fourth hours of Tables I, II, III, and IV training.

5. EXPLANATION/APPLICATION

a. Training Objectives are the same as for MK60 Module 1.

b. Assistant Instructor Duties are the same as for MK60 Module 1.

c. Conduct of Fire Exercises are as follows:

Each student will fire the entire set of 20 engagements, in order.

Maximum time is 60 minutes.

Engagement sequence and criterion scores are as follows:

1 -	80
2 -	80
4 -	80
6 -	80
7 -	120
10 -	120
11 -	120
12 -	136
13 -	136
14 -	160
15 -	184
16 -	160
17 -	184
18 -	184
20 -	208
22 -	208
23 -	208
24 -	368
25 -	304
26 -	368

Student Name _____

AOB Class _____

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
1												
2												
4												
6												
7												
10												
11												
12												
13												
14												
15												
16												
17												
18												
20												
22												
23												
24												
25												
26												

AOB
Experimental
Videodisc
Gunnery Training
Annex C

TOOLS, EQUIPMENT, MATERIALS AND INSTRUCTIONAL AIDS

- 1 TOOLS, EQUIPMENT AND MATERIALS
 - a. Four MK60 gunnery simulators.
 - b. One videodisc and one floppy disc for each simulator.
 - c. Four television monitors.
2. INSTRUCTIONAL AIDS
 - a. Practice Monitor Form for each student.
 - b. Assistant Instructor's guides. Annexes A and B.

Appendix C
AOB Instructor Training

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AOB Instructor Training
Briefing for Participating AOB Instructors
Field Test of MK60 Gunnery Simulator

(Notes: MK60s will be available for demonstration and practice. Briefing should be completed in one hour. Usage logs should be completed.)

You have been asked to assist in the field test of a new tank gunnery simulator for training M60A1 gunners. The device is the MK60. It uses videodisc and computer technology to present realistic targets and simulate live fire characteristics of the M60A1 tank. Today we will discuss:

- 1) Usage records for the MK60.
- 2) Operation of the MK60.
- 3) Test plan for the MK60.
- 4) Practical exercises using the MK60.
- 5) Instructor evaluation of the MK60.

Usage Records for the MK60

In order to evaluate the reliability of the MK60, usage records must be maintained. Each time you or a student uses the MK60, you must complete the usage form. Each of you will be practicing on an MK60 in a few minutes, so you should initiate the form now. When you are through using the device, complete the form.

Operation of the MK60

(Note: Use device to show features and demonstrate.) Is there anyone who has not practiced on the MK60?

Overview. The MK60 consists of a gunner's console, videodisc player with videodisc, and floppy disc reader with several floppy discs. The console has a primary sight, headrest, power, gun, and stabilization switches, ammunition selector and gun controls handles or cadillacs with palm switches and firing triggers. Using information provided by the floppy disc, the MK60 picks up a target scene and TC fire commands from the videodisc. The scene is presented in the gunner's sight and repeated in the monitor. The fire commands are presented over a speaker. The gunner applies M60A1 procedures to engage the target.

The videodisc presently available for use on the MK60 has twenty different engagements. There are main gun engagements, with HEP, HEAT, and SABOT, and there are single and multiple target engagements. All are moving--some approaching, some laterally and some in a zigzag path.

Demonstrate. (Pass out handout on MK60 operation).

To turn on MK60 and begin firing:

1. Videodisc will be in the videodisc player, so no action needs to be conducted regarding the player.

2. Turn on floppy disc reader with switch located on back of disc reader.
3. Turn gunner console key switch (on side) to "ON" position.
4. With floppy disc label up and slot toward disc reader, insert floppy disc into disc reader until you feel a click. Close cover.
5. After about 60 seconds, MK60 scoreboard will appear with a flashing number designating the first mission to be engaged. Press "START" to engage the first mission.

(Press "START." Have instructors watch monitor. Engage the target. Point out difference between hit burst and miss burst. Point out visual "UP" for second and subsequent rounds.) An engagement ends when you either hit the target or run out of time. The scoreboard then presents four pieces of information:

- 1) a mission score based on . . . ,
- 2) time in seconds to hit the target and,
- 3) number of rounds used.
- 4) average miss mils is also presented.

The maximum possible mission score is shown on the scoreboard (point at), and this score is obtained if a first round hit is achieved within five seconds.

6. The MK60 will present engagements in the sequence for which it was last programmed. After firing on engagement, press "START" to begin the next engagement.
7. Press "RELOAD" to add ammo and return to the beginning of the programmed engagement sequence.

To turn off MK60:

1. After completing an engagement and with key switch in "ON" position, remove floppy disc by pressing the bar on the front of the floppy disc reader. Disc will spring out so be ready to catch it.
2. Turn off floppy disc reader with switch on the back of reader.
3. Turn off gunner console with key switch.

Practice. (Have each instructor turn on the MK60, fire several engagements, reload and turn off the MK60. Give guidance and answer questions.)

Programming. When the MK60 is turned on, the previous program will be activated. At times the program will be changed to accommodate training needs.

Test plan for the MK60

In order to evaluate the training effectiveness of the MK60, you will be presenting practical exercises to selected soldiers from your AOB class. Sixteen soldiers will receive MK60 training. Half of those will receive training for approximately one hour; it will substitute for some lab 6 time tomorrow. The other half will also receive MK60 training that one hour plus they will receive additional MK60 practice during the time they fire Tables 1 - IV. These sixteen specially trained soldiers, along with eight other control group soldiers who will undergo normal training, will be tested before and after the MK60 training. Before training they will all be given an MK60 pretest. Pretest is this afternoon beginning at 1600. After training they will all receive an MK60 posttest. Later, their Table IV main gun engagement performance will be recorded by through-sight videocameras. In addition, several dry fire exercises will also be videotaped.

You will be presenting the MK60 training.

Practical exercises using the MK60

(Pass out lesson plans)

Lesson plans have been prepared for both MK60 training sessions--that is, the substitute for Lab 6 training and the additional training during Tables 1 - IV.

(Review lesson plans, using them as a guide.)

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Appendix D

Device Tests

<u>Contents</u>	<u>Page</u>
Device Test X	31
Device Test Y	32

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Appendix D
Device Test X

Engagement Number	Target Type	Target Range	Target Movement	Target Cover	Ammo
3	Tank	1000m	Static	Open	APDS
4	Tank	1000m	Static	Open	APDS
5	Tank	1400m	Static	Open	APDS
6	Tank	800m	Static	Open	APDS
7	Tank	1200m	Static	Open	APDS
8	Tank	2400m	Static	Partial	APDS
9	Tank	1000m	Crossing	Open	APDS
10	Sparty	1400	Crossing	Open	APDS
11	Tank	500	Crossing	Open	APDS
12	Tank	1200	Closing	Open	APDS
13	Tank	1800	Crossing	Open	APDS
14	Tank	1400	Crossing	Open	APDS
16	APC	2400	Static	Partial	HEAT
17	Tank	2400	Static	Partial	HEAT
18	Truck	1400	Static	Open	HEP
19	APC	300	Static	Open	HEAT
21	Tank	1400	Closing	Open	APDS

Appendix D
Device Test Y

Engagement Number	Target Type	Target Range	Target Movement	Target Cover	Ammo
2	Tank	500	Closing	Open	HEAT
4	Tank	1000	Closing	Open	HEAT
10	Tank	500	Crossing	Open	HEAT
23	Tank	1430	Crossing	Open	APDS
12	Tank	400	Closing	Open	APDS
14	2 Tanks	1400	Closing	Open	APDS
24	2 Tanks	1230	Crossing	Open	HEAT

Appendix E

AOB Dry Fire and Live Fire Tests

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General Procedures
AOB Test Exercise
Perceptronics
(Kennedy Range)

Dry Fire Exercise

1. The dry fire exercise will consist of 9 engagements (see Attachment A). This test will be run by the HumRRO coordinator located in the tower.
2. Students will be tested by crew, with one student per tank on each of four instrumented tanks. All students will be briefed as a group by a HumRRO coordinator at the beginning of the test day. Just before each crew of students mounts the tanks for the exercise, they will receive additional instructions from the HumRRO coordinator. These instructions to students are included as Attachment B.
3. Weapon's department AI's will act as TCs for the dry fire test. They will lay the main gun for direction, announce predetermined fire commands, and make sure the main gun is laid on the designated calibration panel at the beginning and end of all engagements. Their instructions and the fire commands are attached (Attachments C and D).
4. Simulated target vehicles will be a jeep and an APC. Their instructions are attached (Attachments E and F). Back-up vehicles should be available in case of breakdowns.
5. Dry fire testing will begin at 0830, and should be completed by 1200. A practice run with target vehicles and AI's will be conducted at 0800.

Table VI Recording Procedures (through the sight recording)

1. Recording will be conducted only if safety requirements are fully met.
2. Each crew will fire the normal Table VI. The order in which students act as gunner and TC will be predetermined by HumRRO/ARI. Students must participate in this order to facilitate the accuracy and speed of the test.
3. Tanks will be under the control of the range NCOIC/OIC at all tanks.
4. AI duties will be as they are normally conducted with the following addition. Students must be instructed to lay on the designated calibration target prior to beginning Table VI and after firing each of the six engagements. Between engagements the main gun should be left on the calibration target. After the last engagements, the AI should have the students lay on the calibration panel for about ten seconds, then elevate the main gun and conduct their debriefing.
5. The NCOIC/OIC may be asked on occasion to relay a message to a test tank reminding them to lay the main gun on the calibration panel.
6. Breakdown of instrumentation equipment must be expected. Personnel cannot repair those breakdowns unless the entire firing line is not firing. Time for repairs must be anticipated.
7. In order to save videotape, it would be desirable to coordinate the firing of each tank with the video recorders. That requires a 15 second notice to the HumRRO coordinator in the tower from the range NCOIC/OIC that a particular tank is about to be directed to fire and a notice when the tank has completed an engagement. Because this does entail some disruption of the NCOIC/OIC concentration, it seems advisable to begin the test with the video tape rolling continuously. As firing progresses and a routine is established, the NCOIC/OIC and HumRRO coordinator can attempt to coordinate video recording each test tank only when it is firing.

Attachment A
AOB Dry Fire Exercise
Kennedy Range

<u>Run No.</u>	<u>Target</u>	<u>Range</u>	<u>Direction</u>	<u>Speed</u>	<u>Ammo (Announced Only)</u>
1	Jeep	400	R-L	10	SABOT
2	Jeep	400	L-R	20	HEP
3	APC	1800	R-L	10	HEAT
4	APC	1800	L-R	5	HEAT
5	Jeep	600	R-L	20	SABOT
6	Jeep	600	L-R	5	SABOT
7	APC	1800	R-L	5	HEAT
8	APC	1800	L-R	15-20	HEAT
9	Jeep	1000	Toward	10	HEP

Table VI (only if safety requirements are met)

1. Each crew will fire the normal Table VI. The order in which students act as gunner and TC will be predetermined by HumRRO/ARI. Students must participate in this order to facilitate the accuracy and speed of the test.
2. Tanks will be under the control of the range NCOIC/OIC at all times.
3. AI duties will be as they are normally conducted with the following addition. Students must be instructed to lay on the designated calibration target prior to beginning Table VI and after firing each of the six engagements. Between engagements the main gun should be left on the calibration target. After the last engagement, have the students lay on the calibration target for about ten seconds, then elevate the main gun and conduct your debriefing.

Attachment B
Dry Fire
Instructions to Gunners

(To be read by Test Coordinator prior to students mounting tanks)

1. You are about to participate in a dry fire exercise designed to measure your M60A1 gunner skills against moving targets. You will fire 9 engagements. Target vehicles will be an APC and a jeep. The jeep will be used to simulate targets that would be engaged with different types of ammo. For this reason it will be referred to simply as a "moving target" in the fire commands.
You are to use all of the correct gunner procedures to engage these targets. A videotape recording will be made of your sight picture and all communications during the exercise. Your trigger pull is also sensed and recorded.
2. Before beginning the exercise, you will lay the main gun precisely on the designated calibration target. This is to calibrate the video equipment. You will then automatically relay the main gun on the calibration target after each engagement. Also, after completing all 9 engagements, you will relay on calibration.
3. The TC assigned to your tank will issue predetermined fire commands. You are to respond as rapidly as possible and track as accurately as possible, just like you would to achieve a first round hit using the announced ammo.
4. Because there is no round actually fired, your observation will always be "lost." For some of the engagements, the TC will issue a subsequent fire command for you to respond to. For others, the TC will announce "Cease Fire" after the 1st round.
5. Remember the speed and accuracy of all your actions will be recorded. Do your best. Good luck.

Attachment C
TC Instruction
AOB Test Exercises
(Kennedy Range)

Dry Fire Exercise

1. Each gunner will dry fire 9 engagements. The targets for each engagement are a jeep, which will be driven on the 400 meter and 600 meter berms, and an APC which will be driven on the ridge.
2. The exercise will be conducted on the commands of the Test Coordinator. These commands will be transmitted via your tank radio. The actions of the jeep, APC, four firing tanks and video technicians must all be synchronized.
3. Before firing the first engagement and after firing all engagements, students are to lay the main gun on the designated calibration target. The Test Coordinator will ask you to confirm that the student has laid on the calibration target by waving your arm. This will also be a signal that you are ready to start an engagement.
4. Fire commands for each engagement are provided on the attached page. Because we want to simulate SABOT, HEAT and HEP targets, the jeep has simply been described as a "moving target." Students will be instructed to say "lost" after firing. Five of the engagements include a predetermined subsequent fire command. For these engagements, issue the subsequent fire command after "lost" is announced for the 1st round, regardless of their lay. For the remaining four targets, announce "Target, Cease Fire," regardless of their lay.
5. The Test Coordinator will command the jeep or APC to "Move Out" at the beginning of each engagement. As soon as the target vehicle is moving, lay the main gun and begin issuing the initial fire command. Release control to the gunner when he has announced "identified."
6. After firing each engagement, have the student lay on calibration target, and then signal the tower.
7. If you have any problems in the tank, notify the Test Coordinator immediately.

Attachment D
Fire Commands
AOB Dry Fire Exercise
(Kennedy Range)

<u>Run</u>	<u>Initial Fire Command</u>	<u>Subsequent Fire Command</u>
1	Gunner, Sabot, Moving Target, Fire	Over, Drop 2 mils, Fire Target, Cease Fire
2	Gunner, Hep, Moving Target, Fire	Short, Left 5, Add 2 mils, Fire Target, Cease Fire
3	Gunner, Heat, Moving PC, Fire	Target, Cease Fire
4	Gunner, Heat, Moving PC, Fire	Doubtful, Left 2, Fire Target, Cease Fire
5	Gunner, Sabot, Moving Target, Fire	Target, Cease Fire
6	Gunner, Sabot, Moving Target, Fire	Target, Cease Fire
7	Gunner, Heat, Moving PC, Fire	Target, Cease Fire
8	Gunner, Heat, Moving PC, Fire	Doubtful, Right 5, Fire Target, Cease Fire
9	Gunner, Hep, Moving Target, Fire	Short, Right 5, Add 2 mils, Fire Target, Cease Fire

NOTE: Before Run 1, between all runs, and after Run 10, the main gun must be laid on calibration target.

Attachment E
Jeep Driver Instruction
AOB Dry Fire Exercise
(Kennedy Range)

1. You will drive the jeep across the top of two different berms and down the gravel road at designated speeds on the command of the Test Coordinator in order to provide a simulated target for a dry fire exercise. There is no ammo on the tanks. An APC will also be used as a simulated target.
2. There will be 9 different target runs. Five by the jeep and four by the APC. Location, direction and speed of your vehicle for each run are listed on the card you've been given.
3. The Test Coordinator will instruct you when to perform each run. On the command, "Drivers, Ready for Run One," drive to the beginning of Berm A with the jeep on the Berm ready to drive to the end.
4. On the command, "Jeep, Run One, 10 mph, Move Out," accelerate rapidly, but safely to the designated speed, driving in the direction indicated on the card (to the end of the Berm A for Run 1).
5. At the end of each run, position the jeep for the next run and wait for your next "Move Out" command.
6. For runs 3 and 4, drive to the beginning of Berm B and wait for run 5. During runs 7 and 8 you will be instructed to drive up the gravel road to the sign, turn around and wait for Run 9.
7. If at any time you have a question, call the Test Coordinator on the radio.

Attachment F
APC Driver Instructions
AOB Dry Fire Exercise
(Kennedy Range)

1. You will drive the APC across the top and face of the far ridge at designated speeds on the command of the Test Coordinator in order to provide a simulated target for a dry fire exercise. There is no ammo on the tanks. A jeep will also be used as a simulated target.
2. There will be 9 different target runs. Five by the jeep and four by the APC. Location, direction and speed of your vehicle for each run are listed on the card you've been given.
3. The Test Coordinator will instruct you when to perform each run. On the command, "Drivers, Ready for Run One," position your APC on the far road behind the trees to the right of the ridge.
4. During Runs 1 and 2 you do not need to move. Stand ready for Run 3.
5. On the command, "APC, Run 3, 10 mph, Move Out," accelerate as rapidly but as safely as possible to the designated speed, driving in the direction indicated on the card (across the top of the ridge for Run 3).
6. At the end of each run, position the APC for the next run and wait for your next "Move Out" command.
7. If at any time you have any questions, call the Test Coordinator on your radio.

Tower Procedures
for each dry fire rotation
AOB Kennedy Range

Two radios will be used, one for the tanks, and one for the van and drivers.
Students will be briefed before mounting tank.

Tank Radio

- | | |
|------------|--|
| On | 1. Instruct gunners to lay on the designated calibration panel.
Make sure intercom is "ON". |
| On | 2. Make sure header information is recorded. |
| <u>Off</u> | 3. Move APC and jeep into starting positions. |
| On | 4. "Fifteen seconds to start." |
| <u>Off</u> | 5. "Drivers, Ready for Run One." |
| On | 6. "Ten seconds"/"Five seconds" |
| On | 7. "Start Trial" |
| <u>Off</u> | 8. "Jeep, Run One, 10 mph, Move Out."
(WAIT) |
| On | 9. "Return to calibration target." |
| On | 10. "Run 2" |
| <u>Off</u> | 11. "Jeep, Run 2, 20 mph, Move Out."
(WAIT) |
| On | 12. "Return to calibration target." |
| On | 13. "Run 3" |
| <u>Off</u> | 14. "APC, Run 3, 10 mph, Move Out."
(WAIT) |
| On | 15. "Return to calibration target." |
| On | 16. "Run 4" |
| <u>Off</u> | 17. "APC, Run 4, 5 mph, Move Out."
(WAIT) |
| On | 18. "Return to calibration target." |
| On | 19. "Run 5" |
| <u>Off</u> | 20. "Jeep, Run 5, 20 mph down the Berm, Move Out."
"APC, turn around."
(WAIT) |
| On | 21. "Return to calibration target." |
| On | 22. "Run 6" |
| <u>Off</u> | 23. "Jeep, Run 6, 5 mph, Move Out."
(WAIT) |
| On | 24. "Return to calibration target." |
| On | 25. "Run 7" |
| <u>Off</u> | 26. "APC, Run 7, 5 mph, Move Out."
(WAIT) |
| On | 27. "Return to calibration target." |
| On | 28. "Run 8" |
| <u>Off</u> | 29. "APC, Run 8, 20 mph, Move Out."
(WAIT) |
| On | 30. "Return to calibration target." |
| On | 31. "Run 9" |
| <u>Off</u> | 32. "Jeep, Run 9, 10 mph, Move Out."
(WAIT) |
| On | 33. "End of trial. Return to calibration target or hold there." |

Appendix F
AOB Student Questionnaire

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Class _____ Group _____

AOB

Student's Opinion Questionnaire
M60A1 Gunnery Simulator

The purpose of this questionnaire is to find out what you thought about the new MK60 Videodisc Trainer that you have been using to learn M60A1 tank gunnery. It contains a number of statements about the training you have had. Do not put your name on this questionnaire. Your answers will not be seen by anyone other than the research staff, nor will they be put in your military record. They are for research purposes only.

Section A. We would like to know how much you agree or disagree with each of the following statements. For each statement choose the number from the scale below which matches your feeling about the statement. Read each statement carefully.

1	2	3	4	5
/	/	/	/	/
Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree

1. _____ I liked practicing on the MK60 training device.
2. _____ When practicing on the MK60 trainer, I could imagine that I was firing an M60A1 tank.
3. _____ If I could see the target, I could hit it.
4. _____ Most of the practice engagements were too hard.
5. _____ I had trouble finding the targets.
6. _____ Practice sessions on the MK60 were too long.
7. _____ It bothered me that the ammo handle was in the wrong place on the MK60.
8. _____ When practicing on the MK60, I often forgot to say "IDENTIFIED" or "ON THE WAY."
9. _____ I really learned to control the reticle.
10. _____ I thought the problems on the MK60 were challenging.
11. _____ The MK60 helped me learn how to lead moving targets.
12. _____ I tried to better my score on the MK60 each time I practiced an engagement.

13. _____ It was hard for me to imagine that I was really learning tank gunnery.
14. _____ I would like to continue practicing on the trainer when I am assigned to a unit.
15. _____ I had too much practice on the MK60 trainer.
16. _____ I could train on the MK60 without an assistant instructor.
17. _____ The amount of training time I received on the MK60 was not enough to learn M60A1 gunnery.
18. _____ I would like to have had more practice time on the MK60 trainer.
19. _____ The assistant instructor provided useful coaching on the MK60.
20. _____ I learned a lot on the new trainer.

Section B. In this section, we would like you to evaluate how realistic the MK60 trainer seems. That is, we would like you to describe how much you think the MK60 provides a real feeling of live fire at real targets. On the line to the left of each statement write the number from the scale below which describes how realistically you think each feature of the MK60 represents M60A1 gunnery.

1	2	3	4	5
/	/	/	/	/
Not at all	Somewhat	Moderately	Very	Extremely
realistic	realistic	realistic	realistic	realistic

21. _____ Switches and indicator lights
Comment:
22. _____ Cadillac controls
Comment:
23. _____ Sight picture before firing
Comment:
24. _____ Sight picture after firing
Comment:
25. _____ Sound effects of tank turret
Comment:
26. _____ Sound effects of firing
Comment:
27. _____ Sound of fire commands
Comment:

Section C. The MK60 provides several types of information after each engagement. To the left of each type of information write the number from the scale below which describes how helpful that information was to you for improving your performance.

1	2	3	4	5
/	/	/	/	/
Not at all helpful	Somewhat helpful	Moderately helpful	Very helpful	Extremely helpful

28. _____ Engagement score
29. _____ Engagement time
30. _____ Number of rounds used
31. _____ Miss distance in mils

Section D. Imagine that you were just beginning your Conduct of Fire training and that you could choose the proportion of time spent training on the Willey, the MK60 and the turret trainer. In order for you to learn the most effectively, how would you allot your training time? Write in the percent of time you would choose practicing on each trainer. The percentages must add up to 100%.

32. Willey _____
33. MK60 _____
34. Turret _____
trainer

Total 100%

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Appendix G
AOB Instructor Questionnaire

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AOB
Instructor's Evaluation Questionnaire

Perceptronics Videodisc Gunnery Simulator

This questionnaire contains a number of questions about the Videodisc Gunnery Simulator (MK60) which you have been using to teach M60A1 gunnery. For each question, a rating scale is provided for you to describe your opinion about that aspect of the MK60. In addition to your rating, space has been provided for you to write any comments you would like to make.

Please consider each item carefully. Do not put your name on this questionnaire.

Section A. In this section we would like you to tell us about any problems you had while operating the MK60. Do this by describing how often you experienced problems with each of the operating features of the MK60 which are listed below. On the line to the left of each statement write the number from the scale below which describes how often you had problems.

1	2	3	4	5	6	7
/	/	/	/	/	/	/
Always had problems	Almost always	Often	Sometimes had problems	Seldom	Almost never	Never had problems

1. _____ Demonstrating to student
Comment:
2. _____ Starting the engagements
Comment:
3. _____ Observing scoring information
Comment:
4. _____ Viewing the scene in the monitor
Comment:
5. _____ Viewing the scene in the device
Comment:
6. _____ Seeing round simulations
Comment:
7. _____ Hearing sound input
Comment:

Section B. In this section, we would like you to evaluate how realistic the MK60 trainer seems. That is, we would like you to describe how much you think the MK60 provides a real feeling of live fire at real targets. On the line to the left of each statement write the number from the scale below which describes how realistically you think each feature of the MK60 represents M60A1 gunnery.

1	2	3	4	5
/	/	/	/	/
Not at all realistic	Somewhat realistic	Moderately realistic	Very realistic	Extremely realistic

8. _____ Switches and indicator lights
Comment:
9. _____ Cadillac controls
Comment:
10. _____ Sight picture before firing
Comment:
11. _____ Sight picture after firing
Comment:
12. _____ Sound effects of tank turret
Comment:
13. _____ Sound effects of firing
Comment:
14. _____ Sound of fire commands
Comment:

Section C. The MK60 provides several types of information after each engagement. To the left of each type of information write the number from the scale below which describes how helpful that information was to you in coaching the trainees to improve their performance.

1	2	3	4	5
/	/	/	/	/
Not at all helpful	Somewhat helpful	Moderately helpful	Very helpful	Extremely helpful

15. _____ Engagement score
16. _____ Engagement time
17. _____ Number of rounds used
18. _____ Miss distance in mils

What other information would have been useful to you? _____

How might any of this information be improved? _____

Section D. This section contains a number of general statements about the MK60. For each statement a rating scale is provided. Circle the number on the scale which best describes your opinion.

19. Using the MK60 as a trainer was:

1	2	3	4	5
/	/	/	/	/
Very difficult	Fairly difficult	Borderline	Fairly easy	Very easy

Comments:

20. Compared to training with the M55 laser, training with the MK60 is:

1	2	3	4	5
/	/	/	/	/
Much less efficient	Somewhat less efficient	About the same	Somewhat more efficient	Much more efficient

Comments:

21. Compared to training with the Willey BOT, training with the MK60 is:

1	2	3	4	5
/	/	/	/	/
Much less efficient	Somewhat less efficient	About the same	Somewhat more efficient	Much more efficient

Comments:

22. On the whole, the practice engagements given with the MK60 were:

1	2	3	4	5
/	/	/	/	/
Much too difficult	Too difficult	About right	Too easy	Much too easy

Comments:

23. If combat units had MK60 devices to practice on, I think their gunnery skills would:

1	2	3	4	5
/	/	/	/	/
Get much worse	Get somewhat worse	Stay about the same	Get somewhat better	Get much better

Comments:

24. Compared to regular training, the MK60 lessons for Lab 6 teach M60A1 skills:

1	2	3	4	5
/	/	/	/	/
Much less thoroughly	Somewhat less thoroughly	About the same	Somewhat more thoroughly	Much more thoroughly

Comments:

25. Compared to regular training, the MK60 lessons for Tables I-IV teach M60A1 skills:

1	2	3	4	5
/	/	/	/	/
Much less thoroughly	Somewhat less thoroughly	About the same	Somewhat more thoroughly	Much more thoroughly

Comments:

26. Training with the M55 Laser should be replaced by training on the MK60.

1	2	3	4	5
/	/	/	/	/
Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree

Comments:

27. Training with the Willey BOT should be replaced by the MK60.

1	2	3	4	5
/	/	/	/	/
Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree

Comments:

28. Training with the MK60 should be used in addition to the normal training.

1	2	3	4	5
/	/	/	/	/
Strongly disagree	Somewhat disagree	Neither agree not disagree	Somewhat agree	Strongly agree

Comments:

Section E. Demographics.

How long have you taught tank gunnery? _____ years _____ months

Which MK60 session did you teach? (Check)

_____ Lab 6 _____ Tables I-IV

General Comments:

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Appendix H

Miscellaneous Forms

<u>Contents</u>	<u>Page</u>
Ability Pretests Score Sheet	61
Pretest Record Form, Test X	62
Posttest Record Form, Test X	63
Pretest/Posttest Record Form, Test Y	64
Instructions to Device Test Administrators	65
Introduction to MK60 Field Trial	66
Privacy Statement	67

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MK60 Gunnery Simulator

Ability Pretests
Score Sheet

Soldier's Name _____ SSN _____

Company & Platoon _____ Date _____

<u>Target Detection</u>		<u>Tracking Task</u>			
<u>Slide</u>	<u>Response</u>	<u>Trial Number</u>	<u>Direction</u>	<u>Total Time</u>	<u>Error</u>
1	_____	1	_____	_____	_____
2	_____	2	_____	_____	_____
3	_____	3	_____	_____	_____
4	_____	4	_____	_____	_____
5	_____	(Remember: Counterbalance direction of track)			
6	_____				
7	_____				
8	_____				
9	_____				
10	_____				
11	_____				
12	_____				
13	_____				
14	_____				
15	_____				
16	_____				
17	_____				
18	_____				
19	_____				
20	_____				
21	_____				

MK 60

TEST X

Pretest Record Form

Student Name _____ Org _____ Date _____

Mission No.	Correct		Announced					Mils	Hit	Tgt
	Gun	Ammo	Ident'd	On-Way	Score	Second	Rounds	Miss	Y	N
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

Test Administrator: At start of each Mission:

1. Turret power will be on.
2. Gun, Coax, and Stabilization switches will be off.
3. SABOT (APDS) will be indexed for first mission or engagement.

MK 60

TEST X

Posttest Record Form

Student Name _____ Org _____ Date _____

Mission No.	Correct		Announced		Score	Second	Rounds	Mils Miss	Hit Tgt	
	Gun	Ammo	Ident'd	On-Way					Y	N
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
16										
17										
18										
19										
21										

Test Administrator: At start of each Mission:

1. Turret power will be on.
2. Gun, Coax, and Stabilization switches will be off.
3. SABOT (APDS) will be indexed for first mission or engagement.

MK 60

TEST Y

Pretest/Posttest Record Form
(Circle)

Student Name _____ BAT Co or
AOB # _____ Date _____

Mission No.	Correct		Announced		Score	Second	Rounds	Mils Miss	Hit Tgt	
	Gun	Ammo	Ident'd	On-Way					Y	N
2										
4										
10										
23										
12										
14										
24										

Test Administrator: At start of each Mission:

1. Turret power will be ON.
2. Gun, Coax, and Stabilization switches will be OFF.
3. SABOT will be indexed for first mission or engagement.

Instructions to Device Test Administrators

At start of test:

SABOT (APDS-T) should be indexed.

Turret (ELEV/TRAV Power) switch should be ON.

All other switches should be OFF.

After each engagement:

Have student turn gun switch to OFF if he fails to do so.

Leave ammo switch unchanged from previous engagement.

Tell student when to push "start" for next engagement.

Read the following instructions to each student:

"You are about to fire several engagements on the MK60 gunnery trainer. This trainer operates like the M60A1 and like the Willey BOT trainer. You should use all the procedures you have learned during your conduct of fire training."

"The MK60 presents moving targets with pre-recorded fire commands. Respond to each fire command just like you should on the M60A1 and engage the target. If you hit the target, you will see a bright orange flash. If you miss, the burst will be smaller. If in doubt, continue firing until you hit the target or time runs out."

For first round of each engagement record:

1. Check if gun switch ON.
2. Correct ammo indexed.
3. Announced IDENTIFIED.
4. Announced ON THE WAY.

Record the following for each engagement:

1. Mission score.
2. Engagement time (seconds).
3. Number of rounds.
4. Miss mils.
5. Target hit.

INTRODUCTION TO MK60 FIELD TRIAL

YOU HAVE BEEN SELECTED TO BE PART OF THE FIELD TRIAL OF A NEW DEVICE FOR TRAINING M60A1 GUNNER SKILLS. AS PART OF THIS FIELD TRIAL ALL OF YOU HAVE BEEN SELECTED TO PERFORM SOME SPECIAL EXERCISES OR TASKS. LATER SOME OF YOU WILL GET TRAINING ON THE NEW DEVICE. THE REST OF YOU WILL BE TRAINED IN THE STANDARD WAY WITH THE REST OF YOUR COMPANY.

TODAY YOU WILL GO THROUGH TWO OF THE SPECIAL TASKS. YOUR SCORES WILL BE USED TO COMPARE SOLDIERS WHO RECEIVE TRAINING ON THE NEW DEVICE WITH SOLDIERS WHO RECEIVE THE STANDARD GUNNERY TRAINING.

IT IS IMPORTANT THAT YOU DO AS WELL AS YOU CAN ON BOTH OF TODAY'S TASKS. HOWEVER, YOUR PERFORMANCE ON THESE TASKS IS NOT AN EVALUATION OF YOU PERSONALLY AND THESE RESULTS WILL NOT APPEAR IN YOUR MILITARY FILE. THE RESULTS WILL ONLY BE USED AS GROUP SCORES TO EVALUATE THE NEW TRAINING DEVICE.

BEFORE WE CONTINUE, LET'S TAKE A MOMENT TO LOOK OVER THIS PRIVACY STATEMENT. PLEASE READ IT TO YOURSELVES AS I READ IT OUT LOUD:

(Read the Privacy Statement)

IF YOU AGREE WITH THIS STATEMENT, PLEASE SIGN IT. THEN PRINT YOUR NAME AND PUT IN TODAY'S DATE.

ONE OF TODAY'S EXERCISES USES A DEVICE THAT HAS HAND CONTROLS SIMILAR TO AN M60A1 TANK. THE OTHER INVOLVES LOOKING AT SLIDES AND FINDING HIDDEN TARGETS.

PLEASE WAIT UNTIL YOU ARE CALLED. SMOKING IS ALLOWED HERE IN THE ENTRANCE HALL AND THESE MAGAZINES ARE AVAILABLE DURING YOUR WAITING TIME. THE LATRINE IS LOCATED THROUGH THAT DOOR AND TO THE RIGHT.

MK60 Gunnery Simulator
Field Evaluation

You are about to participate in data collection procedures developed by the U.S. Army Research Institute for the Behavioral and Social Sciences pursuant to its research mission as prescribed in AR 70-1. When identifiers (name or Social Security Number) are requested, they are to be used for experimental administration and statistical control purposes only. Full confidentiality of all of your responses during these procedures will be maintained in the processing of information during these procedures. Your participation in this research will not affect your military career.

Privacy Statement

I understand that my participation in this research is voluntary. I further understand that I need not provide any personal information; that my performance during experimental data collection periods is only recorded for research purposes and will not be put on my permanent military record.

SIGNED _____

PRINT NAME _____

DATE _____

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Appendix I

Ability Pretests

<u>Contents</u>	<u>Page</u>
Tracking Task, Figure 1	71
Tracking Task, Figure 2	72
Tracking Task Instructions	75
Target Detection Task Instructions	78

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Figure Diamond Tracking Scene

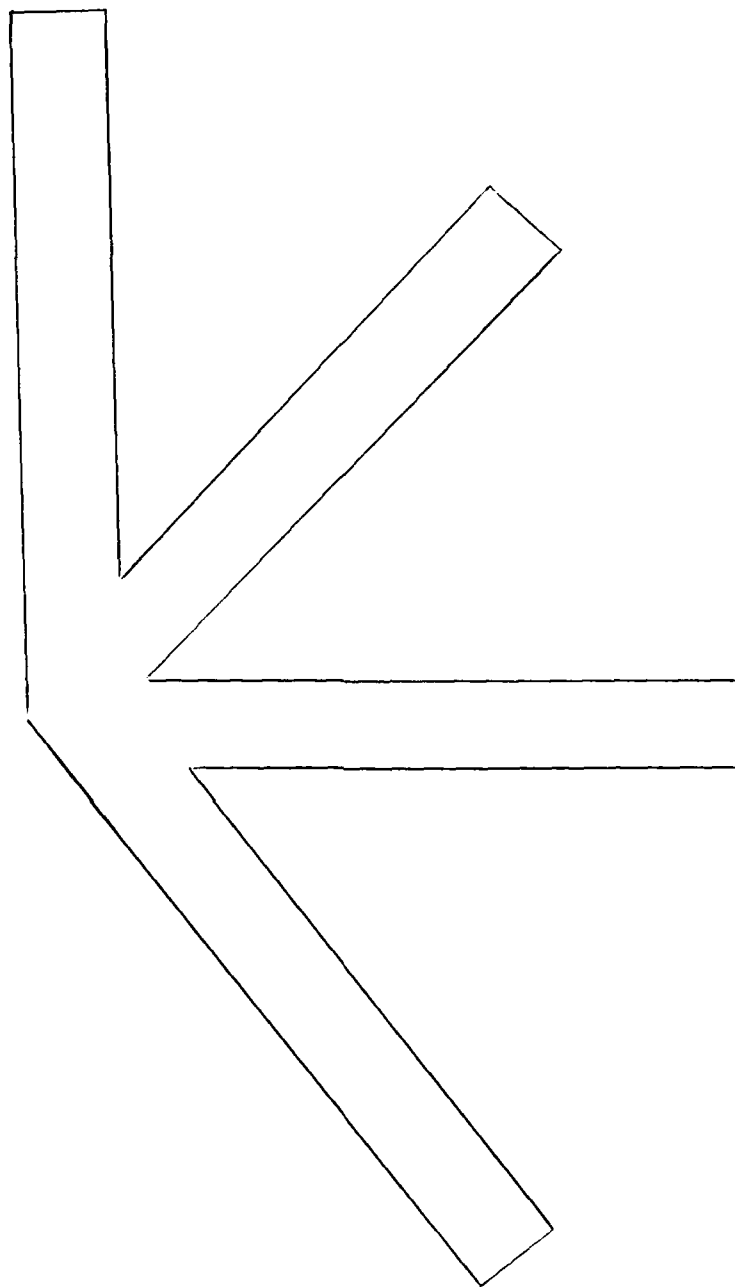


Figure 2
Tracking Problem
(dimensions approximate)

STATION 1

TRACKING

SET UP

Initial

1. Turn on plotter, then Willey. Do not move power control handles unless plotter is on.

NOTE: Plotter must be firmly placed in socket to avoid pen chatter.

2. Ask test supervisor to make daily template.

Before Each Soldier

1. Set Willey to slide #1, the road scene.
2. Ensure plotter pen switch is in "UP" and sweep switch is in RESET.
NOTE: Pen switch will remain in UP throughout. Reset/Sweep switch will be used to control pen lift.
3. Insert paper in plotter. Align to corner guides.
4. Use power control handles to place crosshair at outside right corner of track. Lower pen to paper by setting Sweep switch to SWEEP, then raise pen by setting SWEEP to RESET and overmark the mark.
5. Reverse to alley maze slide and place crosshair on point A. Change back to road slide.
6. Ensure introductory tape is rewound.
7. Ensure stopwatch is charged. (Run off electricity if not.)

CONDUCT

1. Seat soldier. Adjust seat, browpad, focus if necessary.
2. Record name, SSN, date on scoresheet.
3. Run tape. Advance slides as indicated on tape:

Slide 2 - alley maze - reverse

Slide 1 - road scene - forward

NOTE: Follow the taped instructions explicitly. Do not allow soldier more hands-on practice than is directed in the instructions.

NOTE: After the introductory tape, if the soldier has questions about how to operate the power control handles, you may answer him. Do not allow additional practice.

4. Return to slide #1, road scene. Place crosshair at start point (dot at tip of tree, lower corner). Lower pen to paper by setting sweep switch to SWEEP to make start point mark, then raise pen (set sweep switch to RESET) and overmark start point with blue marker. Lower pen to paper.

5. Say "Ready"; soldier should look through eyepiece and grasp power control handles.

6. Say "Track Left" or "Track Right."

NOTE: Soldier should alternate left and right tracking.
Begin tracking to the right.

7. Say "Begin" and start timing. Stop timing when soldier reaches the starting point area after one circuit.

8. Record the time and direction (right or left) on the scoresheet. Remove the paper from the plotter and label it with the trial number and direction (right or left).

NOTE: Have the soldier back out of the sight while you record his score and set up the next trial.

NOTE: If the soldier goes the wrong direction (right or left), change the direction on the next trial. Each soldier must have equal numbers of left and right circuits.

9. Insert paper in plotter, aligned to corner guides. Continue at step 4, for a total of 4 trials or 15 minutes, whichever comes first.

FINAL NOTES: If soldier asks how he's doing, say "We won't know how well anyone has done until everyone has been tested."

If soldier asks to see his tracing, say "You can see one later, after we've finished the test." Then let him see one when he's all done.

Do not tell soldier that the last trial is about to occur.

After last soldier, cap plotter pen.

INSTRUCTIONS TO SUBJECTS FOR THE TRACKING TASK

This equipment simulates the tank gunner's control handles and the sight. Look through the sight, move your head slightly, and adjust your seat until you can easily view the road and nearby trees. (P) In the sight you should also see a set of short lines called a reticle. The center of the reticle is called the crosshair. The gunner uses the crosshair to aim the tank's main gun.

Listen carefully and follow these instructions. [Reverse - Slide 2] Place your hands on the gunner's control handles, look into the sight and slowly turn the control handles to the right. As the crosshair reaches point B, return the control handles to their center upright position to stop. Slowly turn the control handles to the left. As you reach point A, return the control handles to their center upright position. You can move the reticle faster by turning the control handles farther to the right or to the left. The farther you move them from the center upright position the faster the reticle will move.

Now, move the crosshairs from point A to point C by "pulling" or rotating the top of the gunner's control handles toward your body. Return back down to point A by "pushing" or rotating the top of the gunner's control handles away from your body.

You can also move the reticle along a diagonal path up to point D in the sight picture by turning the control handles to the right while at the same time pulling the top of them toward your body. Stop when you reach point D. Now move the reticle back to point A by turning the control handles to the left while at the same time pushing them away from your body. Stop when you reach point A. For practice, move the reticle from point A to point D and back to point A again.

To move the reticle from point A to point E turn the control handles to the right while at the same time pushing them away from your body. Stop when you reach point E. On your own, return to point A. Now, move the reticle from point A to point E again and back for practice. Please back out of the sight now. Do you have any questions about how the gunner's control handles operate? [Forward - SLIDE 1]

The task you are about to perform involves using the gunner's control handles to move the crosshair along the path of the road you see in the sight picture. Your task is to keep the crosshair on the road. If the center of the crosshair touches the road side lines or edges you have made an error. You should try to move the reticle along the path of the road as quickly as you can while trying not to make any errors. Both your errors and your speed will be measured, so make as few errors as possible while moving as quickly as possible. The instructor will place the reticle at the point on the road and give you a "ready" command. You should then look into the sight and place your hands on the hand controls. The instructor will then indicate the direction in which you are to move the crosshair along the road by saying, "Track, right," or "Track, left." When the instructor says, "Begin," you should move the crosshair along the road in the direction you were told to

follow. Move the crosshair all the way around the road in the direction which you are told to go; then stop when you return to the point at which you started. Wait for the instructor to give the next "Ready" command.

Do you have any questions?

STATION 2

TARGET DETECTION

SET UP

1. Insert instruction tape into SINGER CARAMATIC and ensure that it is rewound.
2. Place slide tray on top of SINGER CARAMATIC. Make sure slides are in focus and enlarged. Then set tray at "0" position.
3. Place chair in front of SINGER CARAMATIC with back of chair 36" from screen of CARAMATIC. Use tape on floor to mark position of chair.

CONDUCT

1. Seat soldier, reposition chair if necessary.
2. Put soldier's name, SSN, company & platoon, and date on scoresheet.
3. Run tape. Slides should advance to position 11 (blank), tape will ask soldier if he has any questions and then it will stop.
4. Answer any questions which the soldier has.
5. Restart tape by pressing "pause/restart" button.
6. Make sure that soldier sits in chair with his back against the back of the chair.
7. After each slide, record the soldier's response. Record only his first response to each slide.
8. When tape is completed it will stop. Return soldier to the waiting area.

Recorded Instructions to Subjects
for Target Detection

This task involves what Armor crewmen refer to as target detection. This simply means locating targets. The targets you will be looking for are a tank (Slide 1), armored personnel carrier or APC (Slide 2), or a jeep (Slide 3). (Pause, Slide 4). During this task you will be shown a series of scenes which contain these target vehicles. Each scene contains one and only one target vehicle. Your task is to locate the vehicle. You do not have to identify what vehicle it is, only where it is. You will do this by telling the test administrator in which of the columns marked on the screen the target vehicle appears. (Slide 5). On this slide there is an APC in column 2, so you would simply say "2". (Slide 6). For this slide of a jeep, you would say "4". (Slide 7, blank).

Each slide will only appear a short time and then the screen will go blank. So look quickly, find the target and note which column it is in. Then when the screen goes blank, tell the test administrator which column the target was in. Say only one number. If you say more than one number the test administrator will write down the first number you say. Practice on the next two slides. I'll say "ready" before the slide appears. Ready (Slide 8, 4 seconds, Slide 9, 4 seconds). The target was in column 5, so you should have said "5". Ready (Slide 10, 4 seconds, Slide 11, 4 seconds). The target was in column 3, so you should have said "3".

During the test, sit up straight in your chair with your back against the back of the chair. If you have any questions about this procedure please ask the administrator now. (Stop.)

Before each slide appears, I will simply say the slide number. The test will now begin. Ready. Slide 1. (8 seconds) Slide 2. (8 seconds) (etc. through Slide 21).

The test is now complete. Thank you.

Appendix J

BAT Lesson Plans

<u>Contents</u>	<u>Page</u>
Module 1	81
Practice Monitor Form	93
Module 2	97
Practice Monitor Form	105

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BAT
Module 1
MK60 VIDEODISC SIMULATOR
GUNNERY TRAINING

Partial Substitute for Lesson Plan GC050

MK60 Training in Lieu of TANK TABLES I, II, and III (Day)

A. Administrative Instructions:

1. When training will be given: During time Tank Tables I, II, and III (Day) training is normally given.
2. Training location: SK Hall
3. Who will be trained: Sixteen (16) men, 8 from 2 platoons. List of selected personnel will be provided by ARI R & D Coordinator.
4. Instructors: Four (4) Assistant Instructors/Tank Commanders (AI/TC), one for each MK60 device.
5. Training Aids:
 - (a) Four MK60 simulators, regular and BOT floppy discs, and videodisc.
 - (b) Practice Monitor Forms
6. References:
 - (a) FM 17-12 w/changes 1 and 2
 - (b) FM 17-12-2 w/changes 1 and 2
 - (c) Lesson Plan GC050
 - (d) MK60 Gunnery Trainer Operator's Manual
 - (e) Training Objectives and Videodisc Specifications for use with the Perceptronics Videodisc Gunnery Simulator, ARI/HumRRO, January 1982.

B. Training Objectives:

TASK: Perform the steps required of the M60A1 tank gunner using the MK60 simulator.

CONDITIONS: Given a functioning MK60 simulator, standard and BOT floppy discs, MK60 kill zone set at 100%, and the twenty-problem videodisc.

STANDARDS: Achieve the level of performance stated below for each intermediate objective.

C. Intermediate Training Objectives.

1. Intermediate Training Objective 1:

TASK Respond to TC fire commands.

CONDITIONS: Given an MK60 simulator with TC fire commands recorded on videodiscs. All gunner operated switches will be off at start of each mission.

STANDARDS: The gunner must respond correctly to the fire command as issued, in sequence and without prompts. He must announce "IDENTIFIED." He must not fire until "FIRE" is announced and he must announce "ON THE WAY" and pause before firing.

2. Intermediate Objective 2:

TASK: Engage moving main gun targets.

CONDITIONS: Given an MK60 simulator and twenty problem disc with 16 main gun approaching, retreating, evading and flank moving targets.

STANDARDS: Track and apply appropriate lead necessary to hit targets within 15 seconds.

3. Intermediate Objective 3:

TASK: Sense and observe main gun rounds.

CONDITIONS: Given an MK60 simulator and BOT floppy disc.

STANDARDS: Gunner must announce correct sensing and "BOT" or correct observation.

4. Intermediate Objective 4:

TASK: Adjust fire using BOT after a sensed previous round miss.

CONDITIONS: Given an MK60 simulator and BOT floppy disc with programmed misses.

STANDARDS: Achieve a second round hit following a first round miss within a total of 20 seconds.

5. Intermediate Objective 5:

TASK: Adjust fire according to subsequent fire command.

CONDITIONS: Given an MK60 simulator, BOT floppy disc with programmed misses, and subsequent fire commands issued by AI.

STANDARDS: Achieve a second round hit following a first round miss within a total of 20 seconds.

6. Intermediate Objective 6:

TASK: Engage main gun multiple targets.

CONDITIONS: Given an MK60 simulator, regular floppy disc and twenty problem disc with four multiple main gun engagements.

STANDARDS: Respond to initial fire command; achieve a hit on first announced target, and adjust fire to achieve a hit on second target.

D. Sequence of Activity and Estimated Times

1. Soldiers will be pretested on MK60 by HumRRO personnel. 30 minutes
2. Eight soldiers, two soldiers per MK60, will practice all engagements outlined in Annex E, AI/TC Guide.

TOTAL: 370 minutes
 400 minutes

ANNEXES:

A - Firing Unit Instructions

B - Cadre Briefing

C - Student Briefing

D - Safety

E - AT/TC Guide

F - Practice Monitor Form

Partial Substitute for Lesson Plan GC050

ANNEX A

FIRING UNIT INSTRUCTIONS

1. The Army Research Institute (ARI) will be responsible for transporting experimental subjects to and from SK Hall where training on the device will occur.
2. The firing unit will coordinate with the R & D Coordinator, ARI, five (5) working days prior to date of first training on the MK60.
3. The eight soldiers selected for the low amount experimental group will receive MK60 training on the first day scheduled for Tables I, II and III. The eight soldiers selected for the high amount experimental group will receive MK60 training on the second day scheduled for Tables I, II and III.
4. Experimental soldiers will fire Tables I, II and III - night portion as scheduled.
5. Experimental soldiers and control soldiers will receive no reinforcement training.
6. Equipment: None.

Partial Substitute for Lesson Plan GC050

ANNEX B

CADRE BRIEFING

1. All AI/TCs concerned with conducting training on the MK60 will receive a detailed briefing by ARI/HumRRO personnel prior to conducting training.
2. The AI/TCs will be required to:
 - a. Set up the MK60 for operation.
 - b. Conduct practical exercises using the device.
 - c. Main records of device usage.
 - d. Evaluate effectiveness of the device as a training tool for BAT trainees.
3. Pretesting and posttesting on the MK60 will be done by ARI/HumRRO personnel.

Partial Substitute for Lesson Plan GC050

ANNEX C

STUDENT BRIEFING

1. Soldiers who are selected to serve in experimental and control groups will be briefed on their role by ARI/HumRRO personnel when ability pretests are administered (Week 6).
2. The following items will be covered with students:
 - a. Explanation of need to evaluate the MK60.
 - b. Requirement for students to be moved to and from device location.
 - c. Location of latrine, smoking area, etc.
 - d. Need to protect sensitive electronic equipment.

Partial Substitute for Lesson Plan GC050

ANNEX D

SAFETY

1. As per unit SOP.
2. Avoid contact with electric cables connecting device components.
3. No smoking, eating or drinking around devices.

Partial Substitute for Lesson Plan GC050

ANNEX E

AI/TC GUIDE

1. Duties:

- a. The primary duties of the AI/TC are to instruct the student gunner using the MK60 gunnery simulator and to record practice scores.
- b. The AI/TC is responsible for demonstrating MK60 operation to students and presenting MK60 practice engagement in the sequence prescribed in Appendix 1 of Annex E. There are eight sets of engagements. For each set, have one student fire the set of exercises, then the other student. Students will repeat each set of engagements until each has achieved a mission score which is 80% of possible or until the maximum practice time for the set has elapsed.
- c. The AI/TC will record mission scores on the student's Practice Monitor Form following each engagement.
- d. The AI/TC will give each student gunner a critique at the conclusion of each of the engagements outlined in Appendix 1 of Annex E.
- e. The AI/TC will ensure that each student's Practice Monitor Form is filled out properly including:
 - (1) Student's name
 - (2) Student's company and platoon
 - (3) AI/TC name
- f. Prior to presenting engagements, demonstrate the operation of the MK60 using engagement 1. Particularly point out what a "miss burst" looks like, what a "hit burst" looks like, and the different feedback scores that are provided.
- g. As each student undertakes the engagements, check that he turns on (and off) appropriate switches and announces "IDENTIFIED" and "ON THE WAY" as required.
- h. Students' practice should emphasize speed. A time goal of 15 seconds for each engagement is specified, except for fire adjustment training engagements. A 20 second goal is specified for these engagements.

Partial Substitute for Lesson Plan GC050
Appendix I to Annex E

Conduct of Fire (MK60)

1. Exercise Set 1: Approaching targets--close range.
The MK60 will be programmed to present engagements 1, 2, 7, 12, and 13.
Maximum time for this set of exercises is 30 minutes. 80% criterion scores are as follows:

<u>Engagement</u>	<u>Criterion</u>
1 -	80
2 -	80
7 -	120
12 -	136
13 -	136

2. Exercise Set 2: Approaching targets--distant or evasive.
Engagement sequence and 80% criterion scores are as follows:

6	80
25	304
11	120
22	208
4	80

Maximum time for this set of exercises is 30 minutes.

3. Exercise Set 3: Moving targets.
Engagement sequence and 80% criterion scores are as follows:

10 -	120
15 -	184
23 -	208
17 -	184
18 -	184
20 -	208

Maximum time for this set of engagements is 50 minutes.

4. Exercise Set 4: Multiple targets.
Engagement sequence and criterion scores are as follows:

14 -	160
24 -	368
16 -	160
26 -	368

Maximum time for this set is 30 minutes.

5. Exercise Set 5: Apply BOT (replace regular floppy disc with BOT floppy disc).

Engagement sequence and criterion scores are as follows:

13 -	136
4 -	80
25 -	304
14 -	160
17 -	184
18 -	184
23 -	208
26 -	368
24 -	368

Maximum time for this set of exercises is 70 minutes.

6. Exercise Set 6: Subsequent Fire Commands and standard adjustment with BOT floppy disc).

AI/TC will sense first round and issue a subsequent fire command for each engagement in this set. Engagement sequence and criterion scores are as follows:

15 -	184
6 -	80
20 -	208
12 -	136
7 -	120
22 -	208
11 -	120

Maximum time for this set is 50 minutes.

7. Exercise 7: Review

Each student will fire the entire set of 20 engagements, in order.

Maximum time for the review is 50 minutes.

Engagement sequence and criterion scores are as follows:

1 -	80
2 -	80
4 -	80
6 -	80
7 -	120
10 -	120
11 -	120
12 -	136
13 -	136
14 -	160
15 -	184
16 -	160
17 -	184
18 -	184

20 -	208
22 -	208
23 -	208
24 -	368
25 -	304
26 -	368

MK60

Practice Monitor Form

Student Name _____ AI/TC Name _____

Company and Platoon _____ Date _____

Use this form to record mission scores each time an engagement is practiced on the MK60. Space is provided for three repetitions of each exercise set. Spend no more time than indicated for each set.

Exercise Set 1 - Approaching, close range (30 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
1												
2												
7												
12												
13												

Exercise Set 2 - Approaching, long range and evading (30 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
6												
25												
11												
22												
4												

Exercise Set 3 - Moving (50 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
10												
15												
23												
17												
18												
20												

Exercise Set 4 - Multiple targets (30 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
14												
24												
16												
26												

Exercise Set 5 - BOT (70 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
13												
4												
25												
14												
17												
18												
23												
16												
26												
26												

Exercise Set 6 - Subsequent Fire Command (50 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
15												
6												
20												
12												
7												
22												
11												

Exercise Set 7. (50 minutes)

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
1												
2												
4												
6												
7												
10												
11												
12												
13												
14												
15												
16												
17												
18												
20												
22												
23												
24												
25												
26												

Module 2
MK60 VIDEODISC SIMULATOR
GUNNERY TRAINING

Partial Substitute for Lesson Plan GE-040

MK60 Training in Lieu of Concurrent Training for TANK TABLE IV C (Day)

A. Administrative Instructions:

1. When training will be given: During Concurrent Training, Tank Table IV C (Day).
2. Training Location: SK Hall
3. Who will be trained: Twenty-four (24) men; 8 men from 1 platoon will be trained and tested; 16 men from 2 platoons will be tested only. List of selected personnel will be provided by ARI R & D Coordinator.
4. Instructors: Two (2) Assistant Instructors/Tank Commanders (AI/TC), one for each MK60 device available for training.
5. Training Aids:
 - (a) Two MK60 simulators, regular and BOT floppy discs, and videodisc. Other simulators will be used for testing.
 - (b) Practice Monitor Forms
6. References:
 - (a) FM 17-12 w/changes 1 and 2
 - (b) FM 17-12-2 w/changes 1 and 2
 - (c) Lesson Plan GE-040
 - (d) MK60 Gunnery Trainer Operator's Manual
 - (e) Training Objectives and Videodisc Specifications for use with the Perceptronics Videodisc Gunnery Simulator, ARI/HumRRO, January 1982.

B. Training Objectives:

TASK: Perform the steps required of the M60A1 tank gunner using the MK60 simulator.

CONDITIONS: Given a functioning MK60 simulator, standard and BOT floppy discs, MK60 kill zone set at 75%, and the twenty-problem videodisc.

STANDARDS: Achieve the level of performance stated below for each intermediate objective.

C. Intermediate Training Objectives.

1. Intermediate Training Objective 1:

TASK: Respond to TC fire commands.

CONDITIONS: Given an MK60 simulator with TC fire commands recorded on videodiscs. All gunner operated switches will be off at start of each mission.

STANDARDS: The gunner must respond correctly to the fire command as issued, in sequence and without prompts. He must announce "IDENTIFIED." He must not fire until "FIRE" is announced and he must announce "ON THE WAY" and pause before firing.

2. Intermediate Objective 2:

TASK: Engage moving main gun targets.

CONDITIONS: Given an MK60 simulator and twenty-problem disc with 16 main gun approaching, retreating, evading and flank moving targets.

STANDARDS: Track and apply appropriate lead necessary to hit targets within 10 seconds.

3. Intermediate Objective 3:

TASK: Sense and observe main gun rounds.

CONDITIONS: Given an MK60 simulator and BOT floppy disc.

STANDARDS: Gunner must announce correct sensing and "BOT" or correct observation.

4. Intermediate Objective 4:

TASK: Adjust fire using BOT after a sensed previous round miss.

CONDITIONS: Given an MK60 simulator and BOT floppy disc with programmed misses.

STANDARDS: Achieve a second round hit following a first round miss within a total of 15 seconds.

5. Intermediate Objective 5:

TASK: Apply subsequent fire commands after a previous round miss.

CONDITIONS: Given an MK60 simulator, BOT floppy disc with programmed misses, and subsequent fire commands issued by AI.

STANDARDS: Achieve a second round hit following a first round miss within a total of 15 seconds.

6. Intermediate Objective 6:

TASK: Engage main gun multiple targets.

CONDITIONS: Given an MK60 simulator, regular floppy disc and twenty-problem disc with four multiple main gun targets.

STANDARDS: Respond to initial fire command; achieve a hit on first announced target, and adjust fire to achieve a hit on second target.

D. Sequence of Activity and Estimated Times

1. Soldiers will be posttested on MK60 by HumRRO personnel.	30 minutes
2. Eight soldiers, two soldiers per MK60, will practice all engagements outlined in Annex E, AI/TC Guide.	<u>270 minutes</u>
TOTAL:	<u>300 minutes</u>

ANNEXES

- A - Firing Unit Instructions**
- B - Safety**
- C - AI/TC Guide**
- D - Practice Monitor Form**

Partial Substitute for Lesson Plan GE-040

ANNEX A

FIRING UNIT INSTRUCTIONS

1. The Army Research Institute (ARI) will be responsible for transporting experimental subjects to and from SK Hall where training on the device will occur.
2. The firing unit will coordinate with the R&D Coordinator, ARI, five (5) working days prior to date of first training on the MK60.
3. The 24 experimental and control group soldiers will undertake Table IV C prior to other soldiers so that they may be available for MK60 training or testing as early as possible.
4. Experimental soldiers and control soldiers will receive no reinforcement training.
5. Equipment: None.

Partial Substitute for Lesson Plan GE-040

ANNEX B

SAFETY

1. As per unit SOP.
2. Avoid contact with electric cables connecting device components.
3. No smoking, eating or drinking around device.

Partial Substitute for Lesson Plan GE-040

ANNEX C

AI/TC GUIDE

1. Duties:

- a. The primary duties of the AI/TC are to instruct the student gunner using the MK60 gunnery simulator and to record practice scores.
- b. The AI/TC is responsible for presenting MK60 practice engagements in the sequence prescribed in Appendix 1 of Annex C. There are sets of engagements. For each set, have one student fire the set of exercises, then the other student. Students will repeat each set of engagements until each has achieved a mission score which is 80% of possible or until the maximum practice time for the set has elapsed.
- c. The AI/TC will record mission scores on the student's Practice Monitor Form following each engagement.
- d. The AI/TC will give each student gunner a critique at the conclusion of each of the engagements outlined in Appendix 1 of Annex C.
- e. The AI/TC will ensure that each student's Practice Monitor Form is filled out properly including:
 - (1) Student's name
 - (2) Student's company and platoon
 - (3) AI/TC name
- f. As each student undertakes the engagements, check that he turns on (and off) appropriate switches and announce "IDENTIFIED" and "ON THE WAY" as required.
- g. Students' practice should emphasize speed. A time goal of 10 seconds for each engagement is specified, except for fire adjustment training. A 15 second goal is specified for these engagements.

Partial Substitute for Lesson Plan GE-040
Appendix 1 to Annex C

Conduct of Fire (MK60)

1. Exercise Set 1: Additional Practice

Each student will fire the entire set of 20 engagements, in order. Each student should repeat the set of engagements three times, if possible. Maximum time for this exercise is 270 minutes.

Engagement sequence and criterion scores are as follows:

1 -	80
2 -	80
4 -	80
6 -	80
7 -	120
10 -	120
11 -	120
12 -	136
13 -	136
14 -	160
15 -	184
16 -	160
17 -	184
18 -	184
20 -	208
22 -	208
23 -	208
24 -	368
25 -	304
26 -	368

Student Name _____

Company _____

Repetition

Mission No.	First				Second				Third			
	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss	Score	Sec	Rds	Miss
1												
2												
4												
6												
7												
10												
11												
12												
13												
14												
15												
16												
17												
18												
20												
22												
23												
24												
25												
26												

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Appendix K
BAT Instructor Training

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BAT Instructor Training
Briefing for Participating Instructors
Field Test of MK60 Gunnery Simulator

(Notes: MK60s will be available for demonstration and practice. Briefing should be completed in two hours. Usage logs should be completed.)

You have been asked to assist in the field test of a new tank gunnery simulator for training M60A1 gunners. The device is the MK60. It uses videodisc and computer technology to present realistic targets and simulate live fire characteristics of the M60A1 tank. Today we will discuss:

- 1) Usage records for the MK60.
- 2) Operation of the MK60.
- 3) Test plan for the MK60.
- 4) Practical exercises using the MK60.
- 5) Instructor evaluation of the MK60.

Usage Records for the MK60

In order to evaluate the reliability of the MK60, usage records must be maintained. Each time you (or a trainee) uses the MK60, you must complete the usage form. Each of you will be practicing on an MK60 in a few minutes, so you should initiate the form now. When you are through using the device, complete the form.

Operation of the MK60

(Note: Use device to show features and demonstrate.)

Overview. The MK60 consists of a gunner's console, videodisc player with videodisc, and floppy disc reader with several floppy discs. The console has a primary sight, headrest, power, gun, and stabilization switches, ammunition selector and gun controls handles or cadillacs with palm switches and firing triggers. Using information provided by the floppy disc, the MK60 picks up a target scene and TC fire commands from the videodisc. The scene is presented in the gunner's sight and repeated in the monitor. The fire commands are presented over a speaker. The gunner applies M60A1 procedures to engage the target.

The videodisc presently available for use on the MK60 has twenty different engagements. There are main gun engagements, with HEP, HEAT and SABOT, and there are single and multiple target engagements. All are moving--some approaching, some laterally and some in a zigzag path.

Demonstrate: (Pass out handout on MK60 operation.)

To turn on MK60 and firing:

1. Videodisc he videodisc player, so no action needs to be conducted the player.
2. Turn on floppy disc reader with switch located on back of disc reader.

3. Turn gunner console key switch (on side) to "ON" position.
4. With floppy disc label up and slot toward disc reader, insert floppy disc into disc reader until you feel a click. Close cover.
5. After about 60 seconds, MK60 scoreboard will appear with a flashing number designating the first mission to be engaged. Press "START" to engage the first mission.

(Press "START." Have instructors watch monitor. Engage the target. Point out difference between hit burst and miss burst. Point out visual "UP" for second and subsequent rounds.) An engagement ends when you either hit the target or run out of time. The scoreboard then presents four pieces of information:

- 1) a mission score based on . . . ,
- 2) time in seconds to hit the target and,
- 3) number of rounds used.
- 4) average miss miles is also presented.

The maximum possible mission score is shown on the scoreboard (point at), and this score is obtained if a first round hit is achieved within five seconds.

6. The MK60 will present engagements in the sequence for which it was last programmed. After firing on engagement, press "START" to begin the next engagement.
7. Press "RELOAD" to add ammo and return to the beginning of the programmed engagement sequence.

To turn off MK60:

1. After completing an engagement and with key switch in "ON" position, remove floppy disc by pressing the bar on the front of the floppy disc reader. Disc will spring out so be ready to catch it.
2. Turn off floppy disc reader with switch on the back of reader.
3. Turn off gunner console with key switch.

Practice. (Have each instructor turn on the MK60, fire several engagements, reload and turn off the MK60. Give guidance and answer questions.)

Programming. When the MK60 is turned on, the previous program will be activated. At times the program must be changed.

To reprogram MK60:

1. MK60 must be on and at the end of an engagement with next mission number flashing.

2. Turn key switch on gunner console to "PROGRAM."
3. MK60 scoreboard will present a series of questions and instructions on how to answer. Follow those instructions through the instruction which tells you to turn the key switch to "ON" if you are satisfied with the program of engagements.
4. When programming is completed and you turn the key switch to "ON," the scoreboard will appear with the first engagement in your sequence indicated under NEXT MISSION.

Practice. (Have each instructor turn on the MK60 and program it. They may select engagements at their discretion for this practice. Allow them to fire those engagements, then reprogram another set. Allow them to practice with the device until they are proficient--approximately 30-40 minutes.)

Test plan for the MK60

In order to evaluate the training effectiveness of the MK60, you will be presenting practical exercises to selected soldiers from four companies, 1st Brigade Training (A-2-1, C-4-1, D-2-1 and B-4-1). Sixteen soldiers from each of these companies will receive MK60 training. Half of those will receive training for approximately one day; it will substitute for Tables I, II, and III day laser training. The other half will also receive MK60 training instead of Tables I, II and III day laser training, and they will also receive additional MK60 practice immediately after they fire Table IV C. These sixteen specially trained soldiers, along with eight other control group soldiers who will undergo normal training, will be tested before and after the MK60 training. Before training they will be given (1) an ability pretest of tracking and target acquisition skill, and (2) an MK60 pretest. After training they will all receive an MK60 posttest. Later, their Table VI main gun engagement performance will be recorded by through-sight video-cameras. In addition, several dry fire exercises will also be videotaped.

You will be presenting the MK60 training.

Practical exercises using the MK60

(Pass out lesson plans)

Lesson plans have been prepared for both MK60 training sessions--that is, the substitute for day M55 laser training and the additional training following Table IV C.

Let's first go over the lesson plans to be used for MK60 training in place of day laser training.

(Review the lesson plans using them as a guide. Emphasize the following:)

Section A: - location is SK Hall

- training aids include MK60, regular floppy disc, and an additional floppy disc which creates misses in order for students to practice BOT. We will use it later.
- Practice monitor forms will be used to record practice on the MK60. We will also look at those more closely in a few minutes.

Section B & C Training Objectives for the MK60 include:

- responding to initial fire command by turning on and off all appropriate switches, announcing "identified" and "on the way."
- device will not function unless switches are set correctly.
- instructor must monitor verbal responses.
- engage moving main gun and coax targets.
- apply BOT--use BOT disc which creates a first round miss, so that BOT must be applied to achieve a hit.
- respond to instructor provided subsequent fire commands.
- engage multiple targets.

Section D: - Before training begins, HumRRO personnel will give each soldier a short pretest on the MK60.

Annex A - describes unit instruction.

Annex B - says we will have this briefing.

Annex C - describes some introductory information for the students.

Annex D - gives safety instructions.

Annex E - AI/TC guide, i.e., the instructor's duties for this lesson. (Read steps a. to g. Refer to Appendix 1 and to the Practice Monitor Form. Answer any questions. Tell them a HumRRO person will be at all training sessions to provide assistance as needed.)

There is also a lesson plan for the training session that will follow Table IV C. The session will involve eight men per company, and follows a plan similar to the previous lesson plan. Location and training objectives are the same.

Sequence--Soldiers will fire Table IV C with their unit, then be moved to SK Hall for MK60 training. At the end of the day, HumRRO personnel will give each soldier a posttest on the MK60.

Annex A gives unit instruction.

Annex B gives safety instructions.

Annex C is the AI/TC guide. The duties are the same as in the previous lesson plan. However, there is only one exercise set and it contains all of the previously practiced engagements.

Instructor Evaluation of the MK60

After you have presented instruction to four companies of test trainees, you will probably form opinions about the MK60. We will solicit those opinions, including suggestions for improving the device, by way of a questionnaire. This questionnaire will be given to you after all training is completed. The questionnaire will be confidential in that we will pool all responses and report only a summary of these responses. No individual responses will be reported.

Test Schedule

Last but not least, the dates for MK60 training are as follows (pass out handout of training dates):

<u>Company</u>	<u>Substitute for Tables I, II, III</u>		<u>Additional practice during Table IV C</u>
	<u>Low Group</u>	<u>High Group</u>	<u>High Group Only</u>
A-2-1	22 July	23 July	10 Aug
C-4-1	5 Aug	6 Aug	21 Aug
D-2-1	2 Sep	3 Sep	21 Sep
B-4-1	9 Sep	10 Sep	25 Sep

Four of you will be used during each of the eight training sessions which will replace Tables I, II and III. Two of you will be assigned for each of the four sessions that are in addition to Table IV C.

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Appendix L
BAT Dry and Live Fire Tests

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GENERAL PROCEDURES
BAT Test Exercise
Perceptronics Evaluation
(Boydston Range)

Dry Fire Exercise

1. The dry fire exercise will consist of 8 engagements (see Attachment A). This test will be run by the HumRRO coordinator located in the tower.
2. Students will be tested with one student per tank on each of four instrumented tanks. All students will be briefed as a group by a HumRRO coordinator at the beginning of the test day. Just before each crew of students mounts the tanks for exercise, they will receive additional instructions from the HumRRO coordinator. These instructions to students are included as Attachment B.
3. Holder complex AI's will act as TCs for the dry fire test. They will lay the main gun for direction, announce predetermined fire commands, and make sure the main gun is laid on the designated calibration panel at the beginning and end of all engagements. Their instructions and the fire commands are attached (Attachments C and D).
4. Simulated target vehicles will be a jeep (and the two moving targets). Instructions for the jeep are attached (Attachment E). A back-up vehicle should be available in case of breakdowns.
5. Dry fire testing will begin at 1300, and should be completed by 1700. A practice run with target vehicles and AI's will be conducted at 1200.

Table VI Recording Procedures (overwatch cameras)

1. Recording will be conducted only if safety requirements are fully met.
2. Each crew will fire the normal Table VI. The order in which students act as gunner will be predetermined by HumRRO/ARI. Students must participate in this order to facilitate the accuracy and speed of the test.
3. Tanks will be under the control of the range NCOIC/OIC at all times.
4. TC duties will be performed by company TC's as they are normally conducted with the following stipulation. Prior to the beginning of Table VI, each TC will select the target(s) they will use for each engagement on Table VI. They will inform the HumRRO coordinator which targets they will use. Then, they will use only those targets for all student gunners that they score.

ATTACHMENT A

BAT Dry Fire Exercise Boydston Range

<u>Run. No.</u>	<u>Target</u>	<u>Range</u>	<u>Direction</u>	<u>Speed</u>	<u>Ammo (Announced Only)</u>
1	Tank	C	L-R	10	Sabot
2	Jeep	E	L-R	20	Sabot
3	Tank	B	R-L	15-20	Heat
4	Jeep	E	R-L	10	Hep
5	Tank	D	R-L	10	Heat
6	Jeep	E	L-R	5	Sabot
7	Tank	A	L-R	15-20	Sabot
8	Jeep	E	R-L	5	Heat

A

Far side of far track

B

Near side of far track

C

Far side of near track

D

Near side of near track

E

Road at near berm

ATTACHMENT B

Dry Fire
Instructions to BAT Gunners

(To be read by Test Coordinator prior to students mounting tanks)

1. You are about to participate in a dry fire exercise designed to measure your M60A1 gunner skills against moving targets. You will fire eight engagements. Targets will be a jeep and the moving target panels. The jeep will be used to simulate targets that would be engaged with different types of ammo. For this reason it will be referred to simply as a "moving target" in the fire commands. The moving panels will be called tanks. You are to use all of the correct gunner procedures to engage these targets. A videotape recording will be made of your sight pictures and all communications during the exercise. Your trigger pull is also sensed and recorded.
2. Before beginning the exercise, you will lay the main gun precisely on the designated calibration target. This is to calibrate the video equipment. You will then automatically relay the main gun on the calibration target after each engagement. Also, after completing all eight engagements, you will relay on calibration.
3. The TC assigned to your tank will issue predetermined fire commands. You are to respond as rapidly as possible and track as accurately as possible, just like you would to achieve a first round hit using the announced ammo.
4. Because there is no round actually fired, your observation will always be "lost." For some of the engagements, the TC will issue a subsequent fire command for you to respond to. For others, the TC will announce "Cease Fire" after the 1st round.
5. Remember the speed and accuracy of all your actions will be recorded. Do your best. Good Luck.

ATTACHMENT C

TC Instructions
BAT Dry Fire Exercise
(Boydston Range)

1. Each gunner will dry fire eight engagements. The targets for each engagement are a jeep, which will be driven in front of the near berm and the panels on the two moving target tracks.
2. The exercise will be conducted on the commands of the Test Coordinator. These commands will be transmitted via your tank radio. The actions of the jeep, four firing tanks and video technicians must all be synchronized.
3. Before firing the first engagement and after firing all engagements, students are to lay the main gun on the designated calibration target. The Test Coordinator will ask you to confirm that the student has laid on the calibration target by waving your arm. This will also be a signal that you are ready to start an engagement.
4. Fire commands for each engagement are provided on the attached page. Because we want to simulate SABOT, HEAT and HEP targets, the jeep has simply been described as a "moving target." The moving panels will be called tanks. Students will be instructed to say "lost" after firings. Four of the engagements include a predetermined subsequent fire command. For these engagements issue the subsequent fire command after "lost" is announced for the 1st round, regardless of their lay. For the remaining four targets, announce "Target, Cease Fire," regardless of their lay.
5. The order of the engagements may need to be altered depending on the movement of the panel targets. Listen carefully to the test coordinator who will announce by number the target to be engaged.
6. As soon as the target vehicle is designated, lay the main gun and begin issuing the initial fire command. Release control to the gunner when he has announced "identified."
7. After firing each engagement, have the student lay on the calibration target, and then signal the tower.
8. If you have any problems in the tank, notify the Test Coordinator immediately.

ATTACHMENT D

Fire Commands BAT Dry Fire Exercise

<u>Engagement</u>	<u>Target Location</u>	<u>Commands</u>
1	L-R, near track	Gunner, Sabot, Moving Tank, Fire Over, Drop 2 mils, Fire Target, Cease Fire
2	L-R, road	Gunner, Sabot, Moving Target, Fire Target, Cease Fire
3	R-L, far track	Gunner, Heat, Moving Tank, Fire Short, Left 2, Add 2 mils, Fire Target, Cease Fire
4	R-L, road	Gunner, Hep, Moving Target, Fire Target, Cease Fire
5	R-L, near track	Gunner, Heat, Moving Tank, Fire Target, Cease Fire
6	L-R, road	Gunner, Sabot, Moving Target, Fire Doubtful, Right 2, Fire Target, Cease Fire
7	L-R, far track	Gunner, Sabot, Moving Tank, Fire Short, Add 2 mils, Fire Target, Cease Fire
8	R-L, road	Gunner, Heat, Moving Target, Fire Target, Cease Fire

NOTE: Before Engagement 1, between all engagements, and after engagement 8, the main gun must be laid on the designated calibration panel.

ATTACHMENT E

Jeep Driver Instructions
BAT Dry Fire Exercise
(Boydston Range)

1. You will drive on the road in front of the near berm at designated speeds on the command of the Test Coordinator in order to provide a simulated target for a dry fire exercise. There is no ammo on the tanks.
2. There will be eight different target engagements; four using the jeep and four using the target panels. The jeep is used in engagements 2, 4, 6, and 8. Location, direction and speed of your vehicle for these engagements are listed on the card you've been given.
3. The Test Coordinator will coordinate the engagements. On the command, "Prepare for the Trial" drive to point "A" on the road and wait for engagement two.
4. On the command, "Jeep, Run Two, 10 mph, Move Out," accelerate rapidly but safety to the designated speed, driving in the direction indicated on the card (to point 8 on the road).
5. At the end of each run, turn around and position the jeep for the next run and wait for your next "Move Out" command.
6. The series of eight engagements will be repeated four times.
7. If at any time you have a question, call the Test Coordinator on the radio.

ATTACHMENT F

TC Instructions
BAT Table VI

1. Each student will fire the normal Table VI. The order in which students act as gunner will be predetermined by HumRRO/ARI. Students must participate in this order to facilitate the accuracy and speed of the test.
2. Tanks will be under the control of the range NCOIC/OIC at all times.
3. TC duties will be as they are normally conducted with the following stipulation. Prior to the beginning of Table VI, each TC will select the target(s) they will use for each engagement of Table VI. They will inform the HumRRO coordinator which targets they will use. Then, they will use only those targets for all student gunners that they score.

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Appendix M
BAT Student Questionnaire

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Company _____ Group _____

BAT

Student's Opinion Questionnaire
M60A1 Gunnery Simulator

The purpose of this questionnaire is to find out what you thought about the new MK60 Videodisc Trainer that you have been using to learn M60A1 tank gunnery. It contains a number of statements about the training you have had. Do not put your name on this questionnaire. Your answers will not be seen by anyone other than the research staff, nor will they be put in your military record. They are for research purposes only.

Section A. We would like to know how much you agree or disagree with each of the following statements. For each statement choose the number from the scale below which matches your feeling about the statement. Then write the number on the line to the left of that statement. Read each statement carefully.

1	2	3	4	5
/	/	/	/	/
Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree

1. _____ I liked practicing on the MK60 training device.
2. _____ When practicing on the MK60 trainer, I could imagine that I was firing an M60A1 tank.
3. _____ If I could see the target, I could hit it.
4. _____ Most of the practice engagements were too hard.
5. _____ I had trouble finding the targets.
6. _____ Practice sessions on the MK60 were too long.
7. _____ It bothered me that the ammo handle was in the wrong place on the MK60.
8. _____ When practicing on the MK60, I often forgot to say "IDENTIFIED" or "ON THE WAY."
9. _____ I really learned how to control the reticle.
10. _____ I thought the problems on the MK60 were challenging.
11. _____ The MK60 helped me learn how to lead moving targets.
12. _____ I tried to better my score on the MK60 each time I practiced an engagement.

13. _____ It was hard for me to imagine that I was really learning tank gunnery.
14. _____ I would like to continue practicing on the trainer when I am assigned to a unit.
15. _____ I had too much practice on the MK60 trainer.
16. _____ I could train on the MK60 without an assistant instructor.
17. _____ The amount of training time I received on the MK60 was not enough to learn M60A1 gunnery.
18. _____ I would like to have had more practice time on the MK60 trainer.
19. _____ The assistant instructor provided useful coaching on the MK60.
20. _____ I learned a lot on the new trainer.

Section B. In this section, we would like you to evaluate how realistic the MK60 trainer seems. That is, we would like you to describe how much you think the MK60 provides a real feeling of live fire at real targets. On the line to the left of each statement write the number from the scale below which describes how realistically you think each feature of the MK60 represents M60A1 gunnery.

1	2	3	4	5
/	/	/	/	/
Not at all realistic	Somewhat realistic	Moderately realistic	Very realistic	Extremely realistic

21. _____ Switches and indicator lights
Comment:
22. _____ Cadillac controls
Comment:
23. _____ Sight picture before firing
Comment:
24. _____ Sight picture after firing
Comment:
25. _____ Sound effects of tank turret
Comment:
26. _____ Sound effects of firing
Comment:
27. _____ Sound of fire commands
Comment:

Section C. The MK60 provides several types of information after each engagement. To the left of each type of information write the number from the scale below which describes how helpful that information was to you for improving your performance.

1	2	3	4	5
/	/	/	/	/
Not at all helpful	Somewhat helpful	Moderately helpful	Very helpful	Extremely helpful

28. _____ Engagement score

29. _____ Engagement time

30. _____ Number of rounds used

31. _____ Miss distance in mils

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Appendix N

BAT Instructor Questionnaire

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BAT

Instructor's Evaluation Questionnaire
Perceptronics Videodisc Gunnery Simulator

This questionnaire contains a number of questions about the Videodisc Gunnery Simulator (MK60) which you have been using to teach M60A1 gunnery. For each question, a rating scale is provided for you to describe your opinion about that aspect of the MK60. In addition to your rating, space has been provided for you to write any comments you would like to make.

Please consider each item carefully. Do not put your name on this questionnaire.

Section A. In this section we would like you to tell us about any problems you had while operating the MK60. Do this by describing how often you experienced problems with each of the operating features of the MK60 which are listed below. On the line to the left of each statement write the number from the scale below which describes how often you had problems.

1	2	3	4	5	6	7
/	/	/	/	/	/	/
Always had problems	Almost always	Often	Sometimes had problems	Seldom	Almost never	Never had problems

1. _____ Inserting videodisc record
Comment:
2. _____ Inserting the floppy disc
Comment:
3. _____ Demonstrating to student
Comment:
4. _____ Starting the engagements
Comment:
5. _____ Observing scoring information
Comment:
6. _____ Viewing the scene in the monitor
Comment:
7. _____ Viewing the scene in the device
Comment:
8. _____ Seeing round simulations
Comment:
9. _____ Hearing sound output
Comment:

Section B In this section, we would like you to evaluate how realistic the MK60 trainer seems. That is, we would like you to describe how much you think the MK60 provides a real feeling of live fire at real targets. On the line to the left of each statement write the number from the scale below which describes how realistically you think each feature of the MK60 represents M60A1 gunnery.

1	2	3	4	5
/	/	/	/	/
Not at all realistic	Somewhat realistic	Moderately realistic	Very realistic	Extremely realistic

10. _____ Switches and indicator lights
Comments:

11. _____ Cadillac controls
Comments:

12. _____ Sight picture before firing
Comments:

13. _____ Sight picture after firing
Comments:

14. _____ Sound effects of tank turret
Comments:

15. _____ Sound effects of firing
Comments:

16. _____ Sound of fire commands
Comments:

Section C. The MK60 provides several types of information after each engagement. To the left of each type of information write the number from the scale below which describes how helpful that information was to you in coaching the trainees to improve their performance.

1	2	3	4	5
/	/	/	/	/
Not at all helpful	Somewhat helpful	Moderately helpful	Very helpful	Extremely helpful

17. _____ Engagement score

18. _____ Engagement time

19. _____ Number of rounds used

20. _____ Miss distance in miles

What other information would have been useful to you? _____

How might any of this information be improved? _____

Section D. This section contains a number of general statements about the MK60. For each statement a rating scale is provided. Circle the number on the scale which best describes your opinion.

21. Using the MK60 as a trainer was:

1	2	3	4	5
/	/	/	/	/
Very difficult	Fairly difficult	Borderline	Fairly easy	Very easy

Comments:

22. Compared to training with the M55 laser, training with the MK60 is:

1	2	3	4	5
/	/	/	/	/
Much less efficient	Somewhat less efficient	About the same	Somewhat more efficient	Much more efficient

Comments:

23. Compared to training with the .22 cal. Brewster device, training with the MK60 is:

1	2	3	4	5
/	/	/	/	/
Much less efficient	Somewhat less efficient	About the same	Somewhat more efficient	Much more efficient

Comments:

24. On the whole, the practice engagements given with the MK60 were:

1	2	3	4	5
/	/	/	/	/
Much too difficult	Too difficult	About right	Too easy	Much too easy

Comments:

25. If combat units had MK60 devices to practice on, I think their gunnery skills would:

1	2	3	4	5
/	/	/	/	/
Get much worse	Get somewhat worse	Stay about the same	Get somewhat better	Get much better

Comments:

26. Compared to regular training, the MK60 lessons for Tables I, II and III teach M60A1 skills:

1	2	3	4	5
/	/	/	/	/
Much less thoroughly	Somewhat less thoroughly	About the same	Somewhat more thoroughly	Much more thoroughly

Comments:

27. Compared to regular training, the MK60 lessons for Table IV teach M60A1 skills:

1	2	3	4	5
/	/	/	/	/
Much less thoroughly	Somewhat less thoroughly	About the same	Somewhat more thoroughly	Much more thoroughly

Comments:

28. Training with the M55 Laser should be replaced by training on the MK60.

1	2	3	4	5
/	/	/	/	/
Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree

Comments:

29. Training with the .22 cal. Brewster device should be replaced by the MK60.

1	2	3	4	5
/	/	/	/	/
Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree

Comments:

30. Training with the MK60 should be used in addition to the normal training.

1	2	3	4	5
/	/	/	/	/
Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree

Comments:

Section E. Demographics.

How long have you taught tank gunnery? ____ years ____ months

Which MK60 sessions did you teach? (Check)

____ Tables I - III ____ Table IV

General Comments: